https://atecentral.net

Greater Impact Through Collaboration

Revision 4.1 (141013)

For a copy of this handbook in PDF form please visit
https://atecentral.net/handbook

Preface

Welcome to the *ATE Central Handbook*! The material gathered here is intended to support the goals of ATE projects and centers; help integrate information about their initiatives, events, and valuable resources into the ATE Central portal; and disseminate that information out to others in the NSF community and beyond. At ATE Central, we look forward to working with the ATE community to expand this handbook and make it a useful tool. We encourage project and center staff to offer feedback, as it is critical to building both the *Handbook* and ATE Central itself. We value the opportunity to work with centers and projects to gather best practices in evaluation, collection development, and outreach.

The *Handbook* is available online as a PDF at *https://atecentral.net/handbook*. Please contact ATE Central if you need a different format of the *Handbook* or have any difficulties accessing the PDF.

Please don't hesitate to contact ATE Central with questions, comments, or concerns.

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ATE Central is being built by a team of project partners lead by Internet Scout, a research center at the University of Wisconsin-Madison, under funding from the National Science Foundation via DUE awards 0941067 and 1261744.

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1 Introduction

An enormous quantity of material has been created since the National Science Foundation (NSF) began funding Advanced Technological Education (ATE) initiatives. The ATE program has funded over 1,000 projects and centers to date; each of which has produced valuable contributions to the future of advanced technological education. In 2007 alone, 57 ATE projects and centers developed 2,632 courses, modules, and activities. In 2008, Internet Scout began collecting and organizing information about these initiatives and their educational resources to create ATE Central—an online collaboration portal and collection of materials.

ATE Central helps educators, students, and the general public discover and benefit from the entire depth and breadth of the ATE program. Through ATE Central's online portal, users have access to information about the full range of high-impact ATE resources available. The portal also aggregates information about the ATE centers and projects themselves, helping educators and administrators connect to one another and to the ATE program. In addition, ATE Central coordinates and disseminates important information about events for advanced technological educators, including events sponsored and hosted by projects and centers as well as general ATE conferences, workshops, webinars, and more. This service makes ATE-produced information more accessible, thus broadening the impact of the program.

ATE Central makes it easier for educators to adopt and adapt successful ATE practices. ATE centers and projects have always shared what they have developed and learned on an individual basis; ATE Central continues this tradition through a program-wide, collective dissemination effort. It builds on the work of the ATERC Network, which previously linked eleven ATE Resource Centers with NSF's National Science Digital Library (NSDL) (*http://nsdl.org*) to increase the audience and impact of ATE materials and initiatives.

ATE Central is also a central communication and support hub for all those involved in ATE centers and projects. The site's collaborative tools and reference materials support implementation of successful practices and mentorship of new projects and centers. ATE Central is working on a number of innovative projects and services including a collaborative project with WGBH Boston called *ATE Student Success Stories* – a series of videos that showcase the dynamic work of the ATE program through the eyes of the students within.

This handbook contains information that allows other ATE projects and centers—newly-funded and experienced alike—to enhance their efforts with minimal time and resource investment. It includes an overview of services offered by ATE Central and information about other sources of expertise within the ATE community and beyond.

2 ATE 101

Welcome to the ATE community! If your project has just been funded, and particularly if you have never received NSF funding before, this portion of the *ATE Central Handbook* should be especially helpful.

Since the early 1990s, the National Science Foundation's Advanced Technological Education (ATE) program has focused on education for high-tech fields with an emphasis on programs at two-year colleges. One of the key strengths of the program is the emphasis on creating and strengthening partnerships between academic institutions and employers. NSF makes ATE program awards in three tracks:

> **ATE Central Tip**:
> *Visit the NSF web site to learn more about the ATE program and download the most recent ATE program Request for Proposal (RFP).*

Projects: Projects generally focus on issues like program development and improvement, the creation of educational material, professional development for educators, and/or teacher preparation. There are eight different tracks for ATE projects, including one for groups new to the ATE program.

Centers: There are three different types of centers supported by the ATE program: national, regional, and resource centers. Centers are generally larger in scope and size than projects and focus on a particular field or technology. Centers often start as projects and leverage work already accomplished. Centers also usually have strong collaborative partnerships with other educational institutions and industries, and build on those partnerships to support the goals of their proposals.

Targeted research on technician education: The ATE program also supports research that focuses on technicians, their education, their role in industry and the workforce, and other topics that support the creation of effective technician education.

2.1 Connecting with NSF and the ATE Community

The best way to find out more about the way NSF and the ATE program are structured and to connect with NSF is by contacting your program officer. Program officers help manage various NSF programs, including ATE. ATE is part of NSF's Division of Undergraduate Education (DUE) and is managed by a Division Director, a Deputy Division Director, Program Officers (there is often a Lead Program Officer), and Rotators. Program officers and rotators are usually academics that have been PIs themselves. Both are full time NSF staff, though rotators generally have one- or two-year appointments. Once they have left their rotations at NSF, most rotators go back to their home institutions, although some go on to be program officers and stay at NSF long-term.

Whether your program officer is long-term staff or a rotator, it's easy to find his or her name and contact information by going to FastLane (*https://www.fastlane.nsf.gov/*) and

looking at the information about your project. Emailing or calling your program officer is encouraged. Individual program officers are there to help and may have preferences about how you complete certain requirements—like writing your annual report—so it's good to get to know them and ask their advice.

ATE Principal Investigators (PI) Conference

Each fall, PIs and staff funded by the ATE program come together in Washington, D.C. to share achievements, become inspired by student successes, interact with NSF, and network with their peers. The American Association of Community Colleges (AACC) organizes the event. For those new to the community, it can be a bit overwhelming: there are about 800 very busy people attending, many of whom have known each other for more than a decade. It's a great place to meet people and network, but figuring out how can be a little daunting. The strategies listed here should help you get started.

Preconference workshop and webinar

Every year, the "Getting Started" preconference workshop offers advice and information to those new to ATE. While there is a modest fee to attend, this workshop is a great way to learn about key figures in ATE, how to connect with NSF, and much more. Make sure to sign up for it when you register for the PI meeting. There is also a preconference webinar offered for those just getting started in ATE. You can find more information by checking AACC's ATE web site (*http://www.aacc.nche.edu/Resources/aaccprograms/ate/Pages/default.aspx*)

> **ATE Central Tip**:
> *If you're new to ATE, the preconference workshop titled "Getting Started" is key – sign up for it when you register for the PI meeting.*

Maximizing the PI meeting

Before you go to the PI meeting, take a little time to think about your goals for attending. As a new project, you may want to use this first meeting to make contacts: see who has projects or centers in your region or field, and connect with those PIs. You will also want to think about how to get others excited about your work and connect with key community members who can help encourage that excitement. If you are bringing staff with you, find some time to go over the goals of your grant together and think about how you can approach the meeting as a team to reach your objectives. Planning prior to the PI meeting can make a world of difference in your approach and its result.

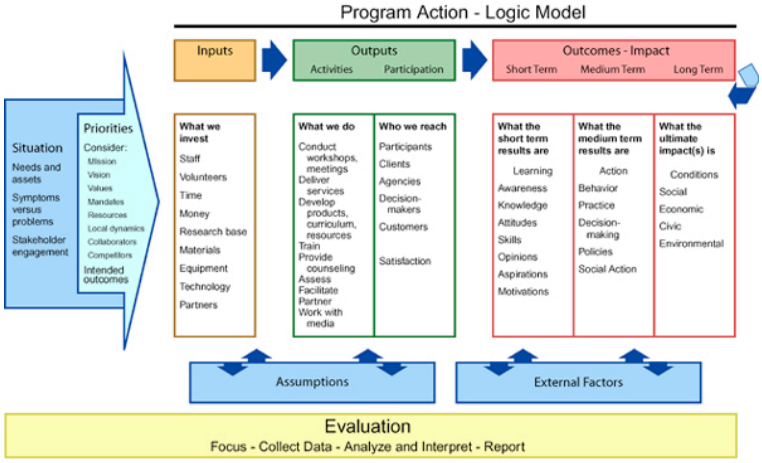
There are several tools to use as you prepare to attend the PI meeting. You can start by going to AACC's PI Conference web site and looking through the information there. You can use ATE Central's map interface (https://atecentral.net/map) to figure out who is already working in your area or your field and then make a list of PIs you'd like to talk to at the conference. ATE Central has also worked with others in the community to create an ATE PI Conference app for a smartphone or tablet designed to help you navigate the meeting, keep track of contacts, and flag presentations you decide to attend. You'll be invited to download the app shortly before the conference.

2.2 Supporting the Growth of your Project or Center

Once your project or center is funded, there is a lot to do: hiring, purchasing new equipment, coordinating with partners, and so on. There is a lot of support from within the ATE community to help you in a number of areas. Within this handbook you'll find information on everything from how to strengthen your evaluation plan to options for conducting online surveys to creating an outreach plan for your project or center. The following sections offer information and project management tools that will help you grow your project or center.

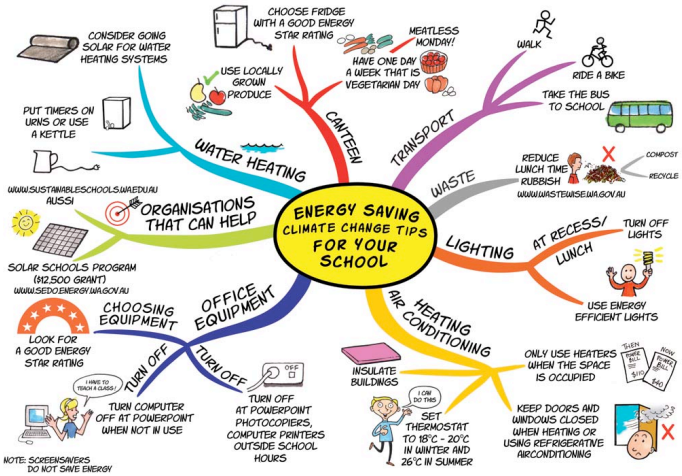
Logic models

The logic model is a great tool for helping you think through project components, like evaluation or outreach, and relate them to your larger goals. You may find that you can use logic models as general planning tools or to "scale up" a particular part of your project or center. There is a lot of great information online about logic models in varying degrees of complexity. To the right is an example of a logic model from the University of Wisconsin-Extension. The ATE-funded Synergy project (http://synergyrpt.org) is another great source of information related to using logic models. Synergy has been working with ATE centers to help them scale up innovations, and logic models have been essential in the process.



Mind mapping

Mind mapping is another way of organizing information related to your project or center. While a logic model is highly organized, a mind map is more free form. It starts with a main idea at the center, which is linked to thematic spokes that radiate out. Mind maps help you think out aspects of your project or center in a multifaceted and visually focused way. It can also be a fun technique in a group brainstorming session with a whiteboard and colored markers. There is a lot of information online about using mind mapping and even software options, though paper and crayons or colored pencils work just as well.



2.3 Advisory Boards and National Visiting Committees

A great way to get feedback and guidance for larger, more complex projects or centers is to create an Advisory Board. Some centers (and occasionally projects) are asked to assemble a National Visiting Committee. Both of these entities can help steer your project or center and act as advisors and mentors. If you are required to create an NVC, your program officer can offer guidance. EvaluATE (http://evalu-ate.net/), an ATE Center at Western Michigan University, is also a very helpful resource.

2.4 Annual and Final Reports

Annual reports provide NSF with yearly information and data about your center or project's impact and activities. Program officers use these reports to learn about grant activities, monitor progress towards goals and objectives, and provide feedback. They also use this information to analyze program impact and produce their own reports. Annual reports are required of all NSF grants.

NSF reports are now submitted under the government-wide Research.gov system, *not* FastLane. To submit a report, go to *http://www.research.gov/*. Click on the first link (Project Reports) to proceed. Project reports may now be submitted only *after* the report due date. The due date for annual reports is 90 days before the anniversary of the grant effective date (which is on your grant letter or the dashboard in Research.gov). The due date for final reports is the grant expiration date. Reports are considered overdue 90 days past the due date. NSF terminology here is confusing, but can be summed up thus: NSF expects you to file the report sometime during the 90 day period between due and overdue dates. An overdue report will block any action on this and other NSF grants for all PIs and co-PIs until the report is submitted and approved.

> ***ATE Central Tip:***
> *Log into Research.gov sooner rather than later and familiarize yourself with the annual report template so that you can be collecting appropriate data and information throughout the year prior to writing your annual report.*

If you are used to filling out annual reports in FastLane, be aware that the new template in Research.gov is not the same. While the basic information required is similar, the questions asked and the report sections are somewhat different. It's also important to note that the same template is used for all NSF project reports, so you may need to interpret broadly some of the categories in order to tell NSF what you have done in the prior year.

Please note that the information above is the latest information we have from the National Science Foundation concerning reporting and is subject to change. If in doubt, call or email your program officer; they are always able to provide the most up-to-date information.

2.5 Further ATE 101 Resources

National Science Foundation Advanced Technological Education
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5464

NSF FastLane
https://www.fastlane.nsf.gov/

ATE Centers
http://atecenters.org/

American Association of Community Colleges (AACC)
http://www.aacc.nche.edu/

PI GUIDE
http://govpiguide.org/

EvaluATE
http://evalu-ate.org/

National Visiting Committee (NVC) Handbook
http://evalu-ate.org/app/webroot/files/uploads/ATE_NVC_Handbook.pdf

Teaching Technicians
https://www.teachingtechnicians.org/

Teaching Technicians: Help for ATE PIs
http://www.teachingtechnicians.org/Resources/PIHelp.aspx

University of Wisconsin – Extension: Logic Model
http://www.uwex.edu/ces/pdande/evaluation/evallogicmodel.html

3 Finding Partners and Collaborators

A key task of any project or center is to harness the skills and capabilities of others by creating partnerships among organizations and people. Partnerships and collaborations take many forms, and can complement a project in many ways, from outreach support to facilities sharing to boosting dissemination efforts. Collaborating with other organizations that have expertise can help you save time and money, avoid reinventing the wheel, and spend your resources more effectively. ATE Central offers a number of ways in which you can find potential partners and collaborators.

> **ATE Central Tip**:
> *Visit the ATE Central map to see other ATE initiatives near you or projects or centers focused in your same field.*

3.1 Types of Partnerships and Collaborations

Throughout the ATE program, there are many different types of partnerships. Community colleges partner with a variety of groups to create robust projects with promising sustainability plans. Possible partners or collaborators to consider include:

- Other ATE projects and centers
- Other NSF programs, such as TUES or ITEST
- Industry
- High schools
- Universities and four-year colleges
- Community organizations
- Professional societies
- Economic development boards
- Government groups
- Non-profit organizations

3.2 ATE Central Map of Projects and Centers

The ATE Central portal offers a map interface that pinpoints the geographic locations of all project and centers. Grantees can use this map to find other ATE initiatives near them as well as information about those initiatives including a description of the project or center, PI contact information, discipline, award number, funding dates, and much more. To find this map, visit *https://atecentral.net* and click on Centers or Projects in the left hand menu. This will display a customizable map of all the active initiatives. Buttons along the top allow you to filter the results to see only active, inactive, or new initiatives, or toggle between centers and projects (or view them both). Under the map, you will find the seven general disciplines of the ATE program: Agricultural and Environmental, Engineering, Information and Security, Advanced Manufacturing, Bio and Chemical, General Advanced Technological Education, and Micro and Nanotechnologies. Clicking these allows you view initiatives that focus on these disciplines. You may zoom in and out and clicking on the map points allows you to see more detailed information about each initiative. You can also switch to simply viewing a list of project or center titles by clicking the "List" link next to each discipline.

3.3 ATE Central Publications and Events

ATE Central publishes the *ATE Central Connection*, a monthly newsletter sent to all PIs that disseminates information to and about ATE centers and projects. The newsletter provides up-to-date ATE news, events, features, outreach tips, and reminders. Additionally, ATE Central maintains an extensive calendar that includes events sponsored by ATE projects and centers as well as events relevant to advanced technological education in general. On this calendar, you can find webinars, workshops, and conferences that will help you build a network of partners and collaborators throughout NSF and beyond. To ensure your event shows up on the calendar and in the ATE Central Connection, use the ATE Central events submission form: *https://atecentral.net/submitevent*.

In order to disseminate events more broadly, ATE Central also offers the Event Widget, which allows you to include a stream of ATE community events on your website. The Event Widget is customizable and can easily be adapted to meet your needs. Create your own Event Widget here: *https://atecentral.net/widget*.

If you have questions about how the ATE Central site works or ideas for how to make it more useful, please don't hesitate to send them to *info@atecentral.net*.

3.4 Further Resources for Finding Partners and Collaborators

Ewing Marion Kauffman Foundation: Encouraging Industry-University Partnerships
http://www.kauffman.org/advancing-innovation/encouraging-industry-university-partnerships.aspx

Pathways to Careers: A Guide to Building Partnerships in Workforce Education and Training
http://www.pathways2careers.ed.gov/

ATE Central Map of Projects and Centers
https://atecentral.net/map

ATE Central Connection
https://atecentral.net/acc

ATE Central Upcoming Events
https://atecentral.net/events

4 Outreach

The National Science Foundation (NSF) requires that grantees demonstrate broader impacts as part of its mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." This means that an outreach and dissemination plan is a critical tool for fulfilling the requirements and goals of your ATE grant. Fortunately, effective outreach and dissemination is also likely to help support your project's ultimate success and sustainability.

In educational communities like the ATE program, the terms "outreach" and "dissemination" are often used interchangeably to describe activity that brings the experiences, knowledge, expertise, and information of your ATE project or center to a wider audience. The terms cover similar ground: outreach is the effort to connect with or to extend a benefit to a wider population; dissemination is the broadcast, circulation, or spread of information. But in actual use, they're a bit different: outreach implies audience engagement or a two-way communication between sender to receiver, while dissemination is a more one-way communication from sender to receiver. In practice, outreach and dissemination can take many forms, such as public talks, lab visits/tours, school or conference presentations, white papers, workshops, and more. The most effective plans incorporate several forms: a white paper that coincides with a press release and a conference presentation, for example.

Your organization's mission and available resources will guide much of your decision-making in creating an outreach plan, of course, but all ATE projects and centers share the same basic goals:

- To promote research findings and work to peer groups, educators, students, and the public at large.
- To generate excitement about science and technology within the project or center's body of administrators, faculty, and students, as well as industries and other key stakeholders.
- To stimulate discussions about and interest in important educational and technological issues.

4.1 ATE Central Outreach Kit

In order to help your project or center develop an outreach plan, ATE Central has created an Outreach Kit (*https://atecentral.net/outreachkit*). Here you'll find a variety of ideas for outreach and dissemination in the Planning, Social Media, and Communications Guides. The Outreach Resources section at the end will direct you to some best practices within the NSF and ATE program, outline how to get started in the ATE community, and much more. If you're ready to show broader impacts, then get started with the ATE Outreach Kit, and put the guides, tips, tools, and templates to use. What follows is a brief overview of what you'll find in the Outreach Kit.

Planning Guide

This section of the ATE Central Outreach Kit will show you, step-by-step, how your project or center can define, plan, and execute your outreach and dissemination needs. It includes project management and assessment tool(s).

Social Media Guide and Directory

This section of the ATE Central Outreach Kit provides a thorough introduction to several types of social media, and how you can use them to support your project or center's or your own professional development. In addition, we've collected a list of all the ATE centers and projects that are using social media, along with some ATE partners and collaborators, so you can easily find them for best practices, professional development, and staying in touch with the ATE community.

ATE Central Tip:
Outreach is a key component of any ATE program's overall commitment to the education of science and engineering technicians, and the scope of your project or center should guide your organization's outreach efforts.

Communications Guide

This section of the ATE Central Outreach Kit provides an overview of how to develop your project or center's outreach messages, how to pitch your project or center (and what you do) to various types of media outlets (large and small), how to build your own Media Kit, and an explanation of which outlets maybe be best suited for your project or center to use for dissemination and outreach – including outlets within the ATE community and NSF.

Further Resources

Here you will find links to best practices within NSF and the ATE community and other Outreach Kits that will help you design your own plan.

4.2 Outreach Resources

ATE Central Outreach Kit
https://atecentral.net/outreach

FLATE Educational Outreach
http://madeinflorida.org/educational-outreach/

NSF Broader Impacts Criterion
http://www.nsf.gov/pubs/2002/nsf022/bicexamples.pdf

American Physical Society (APS) Outreach Guide
http://www.aps.org/programs/outreach/guide/

Google Analytics
http://google.com/analytics/

Google Alerts
http://google.com/alerts

HubSpot
http://hubspot.com

SlideShare
http://slideshare.net

US Department of Health and Human Services: Dissemination Planning Tool
http://www.ahrq.gov/qual/advances/planningtool.htm

US Department of Agriculture Summer Food Service Program: Outreach Toolkit for Sponsors and Feeding Sites
http://www.summerfood.usda.gov/library/toolkit.pdf

5 Managing and Sharing Deliverables

During the course of your project or center's work, you'll create deliverables: research reports, best practices guidelines, skill standards, and instructional materials, to name a few. These deliverables are a physical manifestation of your organization's knowledge; as such, they ought to be effectively managed and shared with others. There are a number of options for organizing your resources; you may choose to create a searchable content collection, arrange resources on your web site, or entrust your materials to another group to maintain and disseminate. Your decision about how to best organize and manage your deliverables will depend on a number of factors, including the size of your resource collection, the availability of resources to effectively manage it, your intended audience, and much more.

5.1 The ATE Central Resource Portal

ATE Central aims to support projects and centers in managing and disseminating their resources to the ATE and greater STEM communities. The ATE Central resource portal is a free, searchable database containing metadata on the deliverables (data such as title, name of creator, resource type, etc.) created by ATE projects and centers, as well as information about the projects and centers themselves. Some examples of materials from the portal include curriculum, instructional videos, podcasts, journal articles, webinar recordings, conference presentations, and online courses; all were created by and for the advanced technological education community.

To find resources from other ATE initiatives, visit the ATE Central site (*https://atecentral.net*). The portal can be searched by keyword, faceted search, or by conducting a more advanced search for a particular resource type, format, author, and more. Additionally, ATE Central has categorized the entire collection into seven broad areas:

> **ATE Central Tip**:
> *Check the ATE Central portal for resources in your field by browsing by ATE Area.*

- Advanced Manufacturing Technologies (Additive, General, and Automotive)
- Agricultural and Environmental Technologies (Agriculture / Aquaculture, Energy, Environmental, and Natural Resources)
- Bio and Chemical Technologies
- Engineering Technologies (General, Electronics, Marine, Materials, Space and Optics)
- Information and Security Technologies (Information and Communications, Geospatial, Logistics, Security and Forensics)
- Micro and Nanotechnologies
- General Advanced Technological Education (Learning Research, Evaluation, Teacher Preparation, and Recruitment)

You can browse or search each ATE area to find materials that might be useful to you as your project or center matures; browsing the collection could also connect you to a potential collaborator or partner working in the same or related field.

ATE Central and your resources

Project and center deliverables are added to the ATE Central portal in a number of ways: we work closely with PIs to stay abreast of initiatives, actively scour project and center web sites for new resources, and accept entire collections to be archived at ATE Central upon completion of your project.

When a project or center maintains materials on its web site, ATE Central staff will seek out and catalog selected resources, thereby capturing information about who created any given resource, what it's about, who benefits from it, what kind of resource it is, and more. In this way, ATE Central creates a valuable metadata library—one that may be utilized by projects and centers as dissemination tool or as a source of discovery for educators, students, and others interested in STEM research, study, or practice.

Additionally, we collect information on the projects and centers themselves, such as the project or center name and description, the name of the Principal Investigator, the award number, and the discipline in which the project or center is engaged. Through the ATE Central portal, users can find information about your project or center quickly and with minimal effort.

Help us make this process faster and more effective by passing along key information to ATE Central's Metadata and Information Specialist at *info@atecentral.net*. Share your web site's URL, the location of resources on your site, and any new information regarding you and your goals. If your materials are already in the portal, feel free to send us feedback.

ATE Central activity reports

All ATE project or centers receive quarterly *Activity Reports* from ATE Central. These reports communicate data about project and center presence and usage of project and center deliverables on the ATE Central site. Reports are generated at the end of each quarter and cover the previous three months. An annual report covering the previous year is generated every January.

Project and center *Activity Reports* contain:

- **Project/center information:** the name of the project/center, the authorized contact, the website, the project/center description, and social media associated with that project/center.
- **Project/center activity:** information about the resources and events from a project/center collected by ATE Central.
- **Subject area activity:** information about the number of current and new resources and events collected by ATE Central in your project/center's primary ATE Area
- **ATE-wide activity:** information about the number of current and new resources and events within the entire ATE community.

Although we do our best to collect information about all ATE community deliverables and events, we are constantly discovering new ones. *Activity Reports,* therefore, document only part of the community's broader impact.

5.2 The ATE Central Archiving Service

Many ATE projects and centers rely on the web to disseminate the resources they create, though not all members of the ATE community have the infrastructure necessary to sustain online access to these resources over time. In order to preserve these and other resources created by ATE awardees—thereby broadening the impact and reach of the ATE community as a whole—ATE Central offers a digital archiving service designed to provide access to these valuable materials beyond the lives of those projects and centers that created them.

Our Service

The ATE Central archiving service is available to all ATE projects and centers as part of the support provided to the ATE community in executing data management and digital curation efforts. ATE PIs who plan to archive with ATE Central at the onset of their funding can effectively prepare for easy ingestion into the ATE Central portal by:

- Identifying important metadata to collect early on;
- Constructing a logical hierarchy of resources through the use of folders and/or naming conventions that maintains existing relationships between related resources; and
- Ensuring that all resource types—audio, video, visual, and textual—are saved in file formats that are accepted for archiving.

ATE Central preserves the integrity of all resources submitted for archiving. This means that contributors must make important decisions, prepare all materials according to ATE Central digital preservation guidelines (below), and be confident of the finality of their submission to ATE Central *prior to ingestion*. ATE Central ensures access to these materials—as curated by the ATE contributor—by enabling users to *download* archived materials for educational purposes or other permitted use.

NEW! The NSF ATE Archiving Requirement

New grantees that apply and are awarded funding under solicitation NSF 14-577 are required to archive their deliverables, as described in their initial grant proposals, with ATE Central. It is important to note that those who receive any new funding (e.g. a center that transitions from regional to national or from national to support center; or a project or center that receives a new round of funding) are also required to archive deliverables created under the new award.

According to NSF 14-577 (*http://www.nsf.gov/pubs/2014/nsf14577/nsf14577.pdf*):

> …, to support project and center sustainability and data management planning and help ensure that the valuable deliverables created through ATE funding remain available after funding ends, ATE projects and centers are required to work with ATE Central to ensure those resources are archived. Specifically, projects and centers that create **resources** that exist at all in digital form (e.g. curriculum, professional development, and recruitment materials) must provide copies of those resources to ATE Central for archiving purposes, in an **archivable format** and with **clear intellectual property information**…Projects and centers are encouraged

to work with ATE Central early in their funding period to develop a plan for preparing and migrating copies of their materials for archiving.

The following sections—Collection Scope, Digital Preservation, and IP Rights—provide further details on:

a) **Resources** ATE Central collects;
b) Acceptable **archivable formats**; and
c) **Intellectual property information** necessary for archiving.

Collection Scope

Central to the ATE community are its deliverables, as initially defined in a project or center's NSF grant proposal and created during the lifecycle of the grant. To ensure long-term access and discoverability, ATE Central collects an assortment of **assessment, instructional, reference, and professional development materials** that are created and/or collected by ATE-funded initiatives. These resources cover seven broad areas of advanced technological education including Advanced Manufacturing Technologies, Engineering Technologies, Bio and Chemical Technologies, Information and Security Technologies, Agricultural and Environmental Technologies, General Advanced Technological Education, and Micro and Nanotechnologies.

Additionally, the portal features information about individual ATE projects and centers and provides access to those materials generated by ATE-funded initiatives that may serve as samples or be otherwise of use to the ATE community in broadening their impact, developing leaders, recruiting students, educating technicians, managing programs, advancing innovation through research, or engaging industry. Samples include, but are not limited to, **research reports, best practices, manuals and guides, policy or procedural documents, or data collection tools** such as surveys. Project and center deliverables and sample resources are made freely available via the ATE Central portal. ATE projects and center PIs are, however, welcome to request restricted access to materials, when appropriate. For example, access to fee-based curriculum may be restricted as not to negatively impact the interests of the project or center that created it.

Finally, ATE Central maintains a subset of limited access materials that document the success of the project or center. These materials are not freely available to the public; rather, they are made available for research purposes or at the request of NSF. Such materials include **internal reports and datasets**. Participant data must be aggregated or otherwise altered to protect individual participant information.

Digital Preservation

Digital preservation efforts promote long-term accessibility of born-digital and digitized resources, thereby ensuring continuous access to these high-impact, web-based resources via a multitude of platforms, over an extended period of time. ATE Central's digital preservation efforts are informed by the *Open Archival Information System (OAIS) reference model* standard and will evolve to reflect newer archival standards as they emerge.

To promote accessibility, ATE Central asks contributors to submit resources—those that fall within ATE Central's collecting scope—in the following file formats only:

Audio	**Video** (max. 1 GB per file)	**Visual**	**Textual**	**LMS**
ACC* .mp3 .alac .ogg .flac	.avi .mkv** .mp4	.bmp .jpeg .gif .png	Microsoft (.docx; .xlsx; .pptx) .rtf .pdf	.imscc

** No copy-protected submissions permitted (.m4a, not .m4p)* ***Must play on VLC Media Player*

LMS resources:
Materials housed in learning management systems, such as Blackboard or Moodle, must be submitted in accordance with IMS Common Cartridge (IMS CC) standards. Specifications are available at *http://www.imsglobal.org/cc/*. Please validate your IMS CC package at *http://validator.imsglobal.org/cc/* to ensure compliance. We ask that *all errors are resolved* prior to submission to ATE Central.

Intellectual Property (IP) Rights
The ATE Central portal provides access to those resources that ATE community members have already dedicated a substantial amount of time, effort, and funds to creating. While access is important, explicit permission to use these copyrighted materials for classroom instruction or other purpose is vital in effectively supporting the needs of all STEM educators and students, both those within the ATE community and those who look to us for guidance.

In NSF 14-577, the NSF states:

> …it is suggested that the developer of new materials license all work (except for computer software source code, discussed below) created with the support of the grant under either the 3.0 Unported or 3.0 United States version of the Creative Commons Attribution (CC BY), Attribution-ShareAlike (CC BY-SA), or Attribution-NonCommercial-ShareAlike (CC BY-NC-SA) license.
>
> These licenses allow subsequent users to copy, distribute, transmit, and adapt the copyrighted work and requires such users to attribute the work in the manner specified by the grantee. Notice of the specific license used would be affixed to the work, and displayed clearly when the work is made available online. For general information on these Creative Commons licenses, please visit *http://creativecommons.org/licenses*.
>
> It is expected that computer software source code developed or created with ATE grant funds be released under an intellectual property license that allows others to use and build upon the work. The grantee may release all new source code developed or created with ATE grant funds under an open license acceptable to the Free Software Foundation (*http://gnu.org/licenses/*) and/or the Open Source Initiative (*http://opensource.org/licenses/*).

To complete your submission to the ATE Central archive, copyright holders must provide notice of any specific license used and *affix this notice* to the work itself. All Creative Common licenses fulfill ATE Central's IP documentation requirement, but our staff will gladly review other terms on an individual basis.

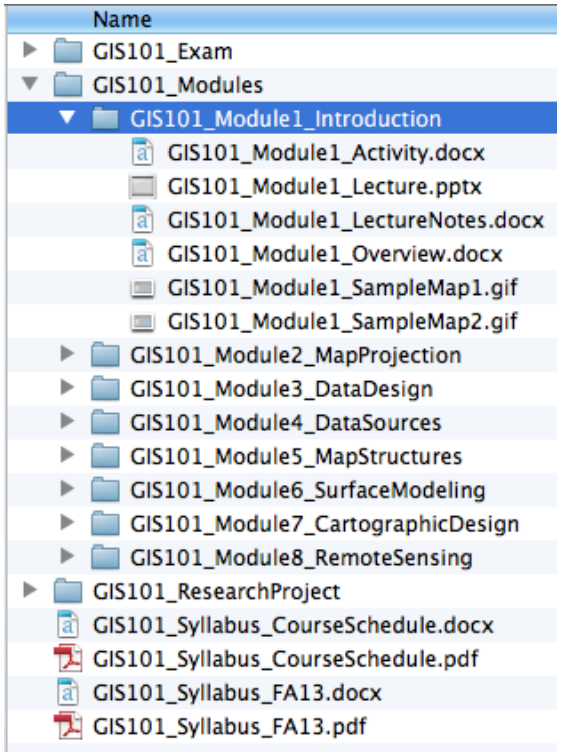
Submission Guidelines
In order to successfully submit one or more ATE project or center resources to ATE Central for archiving, we ask that contributors follow the guidelines below. These guidelines are designed to help ensure that each and every resource in the ATE Central archive is:

- A complete representation of the ATE project or center resource;
- Stored with related resources that have been submitted by an individual ATE contributor;
- Organized in a way that is understandable to all users regardless of their familiarity with any given ATE project or center; and
- Consistently and uniformly ingested into and maintained within the ATE Central Archive.

Submitting Individual Resources
For an individual or collection of resources, submit a *single ZIP file* containing one copy[1] of each of your resources. The use of folders to organize your materials is encouraged. To submit your ZIP, email ATE Central at *info@atecentral.net*. Your ZIP may either be attached to the email or uploaded to Dropbox. If you're unsure how to compress a folder into a ZIP or need additional assistance in preparing your files for transfer, please do not hesitate to contact us. We're happy to help!

Submitting an Academic Course
To submit an entire academic course, submit at least the first three—when appropriate all four—of the following files for archiving:

1. One ZIP file containing *all* individual audio, video, visual, and textual resources;
2. A .pdf copy of the course syllabus;
3. One screen-capture of the LMS course main page; and



Naming Conventions: *Select folder and files names that are understandable to all users regardless of their familiarity with your project or center.*

[1] A single resource may be submitted in more than one format, e.g. *Syllabus.docx* and *Syllabus.pdf*

When appropriate:

4. One validated IMS Common Cartridge file containing the course in LMS-compatible form.

Contributors who submit materials for archiving are asked to:

- Assign uniformly constructed, unique file/folder names; and
- Preserve any pre-existing content hierarchy through the use of sub-folders, naming conventions, etc.

To submit material for archiving, please contact ATE Central at *info@atecental.net*. Remember, ATE Central staff members are committed to helping you successfully transfer your resources to the ATE Central Archive with ease. We welcome any and all questions, comments, or concerns that you may have.

5.3 Creating a Resource Collection

If you decide to create your own resource collection—no matter how large or small—there are some important decisions to make. Who will use your collection? How will they access it? What will it contain? Who will manage it, and how?

Creating a collection development policy

Having a collection development policy will help you guide the creation and growth of your resource library. Once your project or center has completed this template, you will have created a basic collection development policy to manage your collection as it grows. These guidelines draw from the NSDL Collection Development Policy, as well as from other collections created and maintained by Internet Scout, such as AMSER (*https://amser.org)* and the Scout Archives (*https://scout.wisc.edu*).

> **ATE Central Tip**:
> *A collection development policy will help define your collection, for others and for your organization.*

As with any policy, the more specific you are, the more valuable the resulting document will be. Of course, it is not necessary to use the exact headings below or to use them in this order, but the information here should be covered somewhere in your policy. You are encouraged to add any additional information that may be unique to your particular collecting efforts.

Collection development policy template

The collection development policy should guide decision-making as your resource collection grows. For an example policy, please see Appendix A, the ATE Collection Development Policy.

Collection mission: What is the purpose behind your collection? Why did you create and aggregate the resources? Why do you disseminate them? Why are they necessary? What problem(s) do they aim to solve?

Collection audience: Who is the primary beneficiary of your collection? Who will use

these resources, and for what purposes? This audience could be defined by education level, such as high school, or role, such as educator. Audience can also be geographically defined. Members of your audience may have one or more of these different attributes.

Collection scope: What kinds of materials will your collection contain?

- Subject coverage: What specific subjects, disciplines, or fields of study will your collection focus on?
- Resource type coverage: What specific kinds of materials will be in your collection? Some examples include lesson plans, activities, laboratory modules, textbooks, or curriculum guides.
- Format coverage: What specific formats are your resources available in? Some examples include PDFs, Word documents, PowerPoint presentations, HTML web sites, or print.
- Granularity: To what level of detail will you describe the materials in your collection? For digital objects, granularity is generally described in three levels: a learning object, a web site, and a collection of web sites. A single learning object might be one lesson plan, a web site might contain thirty different instructional resources, and a collection of web sites might be a searchable database of sites that have course materials. A digital library can contain materials in one, two, or all three of these levels of granularity.

Collection management: How will your collection be tended and organized for maximum benefit to those that will use it?

- Resource selection: What guidelines will you use to determine what new materials are added to the collection as it grows? How will you stay current with what your audience needs?
- Resource cataloging: In what way will you describe and organize your resources to ensure those who are searching for them will find them? What pieces of information are valuable to know about your resources? What pieces of information might users of your collection search for? What subject vocabularies will you use to describe the resources?
- Resource Maintenance: What kind of "weeding," if any, will you do as your collection ages? How will you keep your collection relevant and useful to your audience? What strategy will you use to update old resources? What technology will help you identify "dead" resources?

Recommended metadata schema

A metadata schema refers to the set of elements used to describe a resource. For the purposes of ATE Central, it is recommended that projects and centers use the basic Dublin Core metadata schema. Dublin Core was designed to be short and simple, unlike many other complex schemas, so non-librarians could add metadata to their own resources quickly and easily. The schema has fifteen fields, but only ten of them are crucial to describing a resource for ATE Central's purposes, and even these ten may not apply to every resource or every circumstance. Below is a basic description of each field and some recommendations on how to apply these to digital resources:

Title: A name given to the resource.

Identifier or URL: The location or unique identifier of the resource.

Description: An account of the resource.

Author(s) or Creator(s): The entity responsible for creation of resource content.

Publisher(s): An entity responsible for making the resource available.

Date Issued: Date of formal issuance (e.g., publication) of the resource.

Resource Type: The nature or genre of the resource.

Format: The file format, physical medium, or dimensions of the resource.

Rights: Information about rights held in and over the resource.

Subject: The topic of the resource.

Collection maintenance

A robust and useful collection of resources must be maintained in order for it to stay relevant to the interests of the community. As you develop your collection development policy, ask yourself: Who will manage your collection, and how? What resources are available to grow and sustain the collection? Seeking answers to these questions at the onset of your collecting effort will help guide you in making sound decisions.

> **ATE Central Tip**:
> *Create a specific schedule for staff members to check your published resources to make sure they are still accurate and appropriate.*

Keep in mind that you will also have to consider what to do with your resources when your ATE funding expires. There are a number of options for sustaining your deliverables, including creating a partnership with your college or organization for long-term server space, collaborating with professional societies, industry cooperation, and more. Another option, provided for free for reasonably sized collections, is ATE Central's Archiving Service.

5.4 Data Management Plan Support for ATE

As of January 18, 2011, the National Science Foundation (NSF) requires all potential grantees to submit a data management plan as supplement to the grant proposal. ATE Central can help you think through the various provisions of your plan, such as the storage, management, and distribution of data. We also offer options that may help cover the archiving and long-term data storage requirements for your deliverables and metadata.

> **ATE Central Tip**:
> *Brainstorm about where your resources will exist in ten years, who will be able to access them, and what you need to do to now make them available for as long as possible.*

What should be included in a data management plan?

The goal of this requirement is to show how proposals conform to the NSF policy on sharing and dissemination of research results. According to the Grant Proposal Guide[2], the two-page data management plan should describe:

1. Types of data, samples, physical collections, software, curriculum materials, and other materials to be produced in the course of the project,
2. Standards to be used for data and metadata format and content (where existing standards are absent or deemed inadequate, this should be documented along with any proposed solutions or remedies),
3. Policies for access and sharing including provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements,
4. Policies and provisions for re-use, re-distribution, and the production of derivatives, and
5. Plans for archiving data, samples, and other research products, and for preservation of access to them.

Tips on creating a data management plan

Here are some questions to consider when creating a data management plan:

- What types of data, metadata, or resources will the project create?
- Which formats will be used to create, share, and store that data?
- What, if any, standards will be used to create the data?
- How and where will that data be stored?
- Who will hold copyright to project data and deliverables?
- How and with whom will data be shared?
- What privacy protections will be extended to those accessing project data?
- What restrictions will be placed on the re-use or re-distribution the project's data?
- How will this data continue to "live" after project funding expires?

5.5 Further Resources for Managing and Sharing Deliverables

Dublin Core Metadata Initiative
http://dublincore.org/

Library of Congress
http://www.loc.gov/

Digital Library Federation
http://www.clir.org/dlf.html

W3C Web Accessibility Initiative
http://www.w3.org/WAI/

[2] National Science Foundation. "Grant Proposal Guide - Proposal Preparation Instructions." Last modified July 2011. *http://www.nsf.gov/pubs/policydocs/pappguide/nsf11001/gpg_2.jsp#dmp.*

Section508.gov
http://www.section508.gov/

NSF Proposal Preparation Instructions on the Data Management Plans
http://www.nsf.gov/pubs/policydocs/pappguide/nsf11001/gpg_2.jsp#dmp

NSF Award and Administration Guide: Dissemination and Sharing of Research Results
http://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/aag_6.jsp#VID4

NSF Data Management and Sharing FAQs
http://www.nsf.gov/bfa/dias/policy/dmpfaqs.jsp

National Science Board's 2005 Report "Long-Lived Digital Data Collections Enabling Research and Education in the 21st Century"
http://www.nsf.gov/pubs/2005/nsb0540/

Association of Research Libraries Guide for Research Libraries: The NSF Data Sharing Policy
http://www.arl.org/rtl/eresearch/escien/nsf/creatensfplan.shtml

NSF Data Plans from Research Data Services from the University of Wisconsin-Madison
http://dataplan.wisc.edu/make-a-plan/nsf-data-plans/

6 Evaluation

All ATE centers and projects recognize the importance of a robust evaluation plan and the benefits of evaluation for individual projects and centers as well as for the ATE program as a whole. While almost every project has some form of evaluation plan built into its NSF proposal, it can help to have support from the community when it comes time to put that plan into action. ATE has several crosscutting projects that offer evaluation support, and plenty of resources from outside ATE can enhance the evaluation component of your project.

6.1 Support for Evaluation Within NSF and ATE

These organizations, funded or maintained by NSF, can help you create, refine, and implement your evaluation plan:

EvaluATE
http://evalu-ate.net

EvaluATE promotes the goals of ATE projects and centers to strengthen the program's evaluation knowledge base, expand the use of exemplary evaluation practices, and support the continuous improvement of technician education. The EvaluATE site provides an array of resources to help projects and centers develop and carry out successful evaluation plans. The results from the annual survey of ATE projects and centers can also be found here. For a copy of the most recent results, see Appendix C.

> **ATE Central Tip**:
> *Put your evaluation specialist in touch with EvaluATE – they can help provide insight into how others in the ATE community are doing evaluation and help connect your evaluator to other project and center evaluation specialists!*

Synergy Collaborative
http://synergyrpt.org/

The Synergy project works with a group of ATE centers to support scaling up project components. While it is not a project that focuses exclusively on evaluation, the Synergy group does rely heavily on the use of logic models and other evaluation tools. The group has a variety of experts and a growing body of knowledge in the area of evaluation.

The 2002 User-Friendly Handbook for Project Evaluation
http://nsf.gov/pubs/2002/nsf02057/start.htm

This guide was developed to support those working with the NSF, and provide some basic guidelines for the evaluation of NSF's educational programs. Its goal is to help grantees that need to learn more about both how to do an evaluation as well as what evaluation can do for the project. It builds on firmly established evaluation principles, combining technical details and common sense to meet the particular needs of NSF grantees and stakeholders.

6.2 Other Resources for Evaluation

There are many valuable resources online to help with building your evaluation plan, and assist in integrating evaluation into the day-to-day management of your project. Here are several high quality resources that may prove helpful for supporting your project or center's evaluation. Each links to more resources including logic model templates, checklists, and other useful evaluation tools.

Kellogg Foundation
http://www.wkkf.org/knowledge-center/publications-and-resources.aspx

As a funding agency, the W.K. Kellogg foundation is known for supporting human rights and working to improve living conditions for children and adults and funding projects that serve communities and society.

Their online publications and resource center provides users with a variety of materials to support successful project management and evaluation.

Evaluating Digital Libraries: A User-Friendly Guide
http://www.dpc.ucar.edu/projects/evalbook/

Supported by funding from the NSF's NSDL program, this very useful and usable guide helps collection developers and others plan and execute evaluation for digital libraries and collections. With sections on planning, usability evaluation, log analysis, creating surveys and much more, this guide will prove useful for those creating smaller focused collections or for larger resource center projects.

7 Tools & Technology

There are a variety of tools available to support the goals of ATE projects and centers, whether those goals are building an online digital collection, surveying educators or industry, providing webinars for project updates or collaborating with project partners, or something else entirely.

7.1 CWIS: Open-Source Digital Collection Software

ATE Central's online portal is built using CWIS, digital library software developed by Internet Scout. Developed with funding from the Mellon Foundation and the NSF, CWIS is open-source and free for anyone to use. A number of ATE centers and NSDL projects use CWIS for their digital collections.

In addition to a highly searchable database, the software offers a number of handy features that allow collection developers to quickly and easily create a digital library, including a customizable interface and tools that allow you to create and edit your own metadata schema. CWIS has keyword, faceted search, and advanced fielded searching capabilities, and allows you to save, narrow, or refine searches in a number of ways. A very useful feature is that it allows users to rate resources (from one to five stars) or add comments about those resources for others to read. A customizable bulletin service alerts users when new resources in their field have been added.

With built-in cataloging and workflow tools as well as a customizable metadata schema, CWIS offers those in ATE community an easy solution for creating their online digital library. Below is a basic feature list for the CWIS software:

SEARCHING / BROWSING
Keyword searching
Fielded searching
Synonym support
One-click searching
REST-compliant search URLs
Field weighting
Phrase support and term exclusion
My Searches feature
Dynamically generated browse UI
Multiple taxonomy support

USER PARTICIPATION
Resource rating
Resource commenting/discussion
Monitoring of recent comments
Integrated usage tracking support
OpenID single sign-on support

METADATA TOOL
Completely configurable schema
15 fundamental data types
One-click vocabulary and taxonomy import
One-click controlled vocabulary export
Multi-modal term selection interface
Integrated automated URL checker

RECOMMENDER SYSTEM
Amazon.com-style recommendations
Content-based recommender
Field weighting support

RSS
Configurable RSS feed export
Multiple RSS feed import
User-customizable RSS feeds

ACCESSIBILITY
W3C/WAI compliant interface
ACCLIP metadata field support

OAI-PMH
Configurable CWIS/OAI field mapping
Any controlled field usable for OAI sets
OAI-SQ (search via OAI) support

USER INTERFACE
Support for multiple custom interfaces
Complete PHP/HTML separation
Plugin system providing hooks for customization
User interfaces assignable on per-user basis
Pre-packaged subject-oriented "themes"
CAPTCHA anti-spambot support
Google Maps integration support

TECHNOLOGY
Integrated SQL caching to reduce DB load
Linux, Solaris, OSX supported
Fast (5 minute) installation
Drupal integration support
phpBB integration support

7.2 Webinar Platforms

Used with increasing frequency, webinars are great avenues for partner meetings, providing users with project updates, or presenting information about project or center deliverables to industry or educators. If you'd like help hosting your webinar, MATEC NetWorks (an ATE Center) provides a hosting service (see *http://matecnetworks.org/hosting/* for more information). If you are interested in setting up your own webinars, here are a few popular options:

AnyMeeting
http://anymeeting.com/
Free for up to 200 attendees

AnyMeeting is completely free for up to 200 webinar attendees, and you can record meetings as well as use features like screen sharing, polling, text chat and much more.

GoToMeeting
http://gotomeeting.com
Pricing for webinars with up to 15 participants is $49 per month

Go to Meeting has a whole suite of products (GoToMeeting; GoToWebinar; GoToTraining). GoToMeeting is the least expensive of the products offered. GoToMeeting provides the basics, allowing you to screen share, record your meeting, and conduct audio conferencing, but is more expensive than other webinar packages available.

ReadyTalk
http://readytalk.com
Pricing for webinars with up to 25 participants is $49 per month

ReadyTalk focuses on delivering an easy-to-use product, providing web and audio conferencing as well as recording and archiving services. ReadyTalk's prices seem to be about average for a webinar package and the site provides a resource center with documentation and training materials to help users get started.

WebEx
http://webex.com
Pricing for webinars with up to 25 participants is $49 per month

WebEx is a CISCO product, with average pricing for a webinar package. The site has a host of demo videos, though they are primarily related to using the package in industry settings for sales and training rather than in educational settings.

7.3 Online Survey Packages

Creating an online survey these days couldn't be easier. Whether you are gathering data about your web site's usability or creating a quick questionnaire to help evaluate workshop participants' satisfaction, you can find an easy-to-use (and often free) solution readily available. Below are several packages to explore:

LimeSurvey

http://limesurvey.org

> **ATE Central Tip**:
> *If you're just starting to experiment with online surveys, LimeSurvey is pretty hard to beat; it's free!*

With LimeSurvey, users can create an unlimited number of surveys at the same time, with unlimited questions and unlimited responses and participants. Users have access to 20 different question types (and more are on the way) and the package has built-in user management tools to make managing your survey easy.

SurveyMonkey

http://surveymonkey.com

The free version of SurveyMonkey provides users with an unlimited number of surveys, 10 questions per survey, 100 responses per month, and 15 question types. For $20 a month, users can move up to some basic branding on their surveys, 1000 responses per month, and unlimited questions.

SurveyGizmo

http://surveygizmo.com

SurveyGizmo's free version of their package provides users with an unlimited number of surveys and questions and 250 responses per month. For $19/month, users get unlimited questions and surveys plus 1000 responses per month, along with more customization of surveys.

Zoomerang

http://zoomerang.com

Zoomerang's free offering provides an unlimited number of surveys, 12 questions and 100 responses a month. For about $16 a month, users get unlimited questions, unlimited responses along with advanced reporting and analytics, and professional survey templates.

Appendix A: ATE Central Collection Development Policy

The ATE Central collection showcases the work of the National Science Foundation's (NSF) Advanced Technological Education (ATE) community. The collection includes information about ATE project and centers as well as the resources they create and collect. The collection's metadata feeds into a variety of services on the ATE Central portal and is harvested by others outside ATE to help bring these resources to a wider audience. Collection records and metadata are freely available to those in the ATE community to use in their own collection development or other project and center efforts.

ATE Central Users

ATE Central's primary audience is the ATE community made up of approximately 300 active NSF-funded projects and centers nationwide and the audiences they serve as well as their industry partners. We also aim to connect others outside ATE (educators, students, and others engaged in STEM research, study, and practice) to the work of the ATE program. While our focus is on serving users located in the United States and the majority of our resources are in English, ATE Central is a freely and globally available web portal that provides access to users around the world.

Collection Scope

ATE Central documents and makes available the work of the ATE community through the acquisition, organization, and preservation of its digital resources. The ATE Central portal supports these efforts by acting as information hub for a full range of high-impact, web-based ATE resources; these resources may either be "born digital" or converted to digital form from a print resource.

Subject coverage

Central to the ATE community are its deliverables, as initially defined in a project or center's NSF grant proposal and created during the lifecycle of the grant. To ensure long-term access and discoverability, ATE Central collects an assortment of **assessment, instructional, reference, and professional development materials** that are created and/or collected by ATE-funded initiatives. These resources cover seven broad areas of advanced technological education including Advanced Manufacturing Technologies, Engineering Technologies, Bio and Chemical Technologies, Information and Security Technologies, Agricultural and Environmental Technologies, General Advanced Technological Education, and Micro and Nanotechnologies.

Additionally, the portal features information about individual ATE projects and centers and provides access to those materials generated by ATE-funded initiatives that may serve as samples or be otherwise of use to the ATE community in broadening their impact, developing leaders, recruiting students, educating technicians, managing programs, advancing innovation through research, or engaging industry. Samples include, but are not limited to, **research reports, best practices, manuals and guides, policy or procedural documents, or data collection tools** such as surveys. Project and

center deliverables and sample resources are made freely available via the ATE Central portal. ATE projects and center PIs are, however, welcome to request restricted access to materials, when appropriate. For example, access to fee-based curriculum may be restricted as not to negatively impact the interests of the project or center that created it.

Finally, ATE Central maintains a subset of limited access materials that document the success of the project or center. These materials are not freely available to the public; rather, they are made available for research purposes or at the request of NSF. Such materials include **internal reports and datasets**. Participant data must be aggregated or otherwise altered to protect individual participant information.

Form coverage

ATE Central links to and collects materials in various video, audio, visual, and textual formats, such as Flash videos, PowerPoint presentations, mp3s, and PDFs. ATE Central may choose to direct users to any number of file formats; special software required to view these resources is noted in the resource record. Materials submitted for archiving must follow the requirements laid out in ATE Central's *Archiving Service Policy* at the time of submission. Acceptable formats for archiving may change as new formats are introduced, standards evolve, and outdated formats become obsolete.

Granularity

Granularity refers to the level of detail at which a resource is described. ATE Central aims to catalog both narrowly focused, individual materials as well as larger, more complex materials. A single lesson plan, lecture, video or case study, for example, represents the finest level of granularity. Entire courses, portals to collections, and other comprehensive sites are also included. It is common in ATE Central to have a resource record for a larger collection, in addition to individual records for each specific resource within said collection.

Resource Selection

Project and center deliverables are added to the ATE Central portal in a number of ways; ATE Central collection staff work closely with principal investigators (PIs) and staff to stay abreast of initiatives; ATE Central actively reviews project and center web sites for new resources, and accepts partial or entire collections to be archived with ATE Central upon request.

Active project and center resources

ATE Central aims to gather all resources **created** by projects and centers as well as any high-quality resources that are published by authoritative sources and **collected** by projects and centers. Since ATE projects and centers are experts in their respective fields, ATE Central relies on their expertise to determine which resources are valuable to the ATE community, suitable for long-term preservation, and most likely to benefit ATE educators, students, and other community stakeholders.

Each resource considered for selection is evaluated based on the following criteria:

(1) The resource is befitting ATE Central's mission, scope of collections and/or collecting plan;
(2) The resource is of known provenance and is—to the best of ATE Central's knowledge—free of any intellectual property restrictions;
(3) The resource is available in an accessible digital format or via a reliable web address;
(4) The resource is presented in a professional manner; i.e. well-written and organized with a clear purpose and audience, designed for both usability and accessibility;
(5) The resource is unique to ATE Central's collection; and
(6) When a fee is associated with the resource, that fee is deemed non-prohibitive by ATE Central collection staff.

Archived resources

The ATE Central archiving service is available to all ATE projects and centers as part of the support provided to the ATE community in executing data management and digital curation efforts. ATE Central preserves and provides access to all suitable resources submitted for archiving as long as those resources meet the requirements of the ATE Central *Archiving Service Policy*. In short, all archived resources must: a) fall within the ATE Central collection scope; b) meet ATE Central's intellectual property rights requirements; and c) be submitted in accordance with ATE Central's digital preservation and submission guidelines.

Resource Cataloging

ATE Central cataloging is based heavily on the Dublin Core Metadata Initiative (DCMI). In an effort to create standard, interoperable metadata, we have drawn from DCMI's guidelines to include descriptive, subject, as well as administrative metadata. All resources are cataloged according to ATE Central's *Cataloging Procedures*. Cataloging procedures and metadata standards for ATE Central are documented and used to support other collections and internal training purposes.

Policy Review and Revision

Collection staff will review the collections development policy every three (3) years. Suggested revisions to this document will be presented to the Director for approval. Collection staff will regularly develop and improve procedures to implement these policies. Suggested revisions of a procedural nature may be submitted to the Director on an ongoing basis.

Appendix B: ATE Central Data Management Plan

This plan describes how data, materials, and resources created by ATE Central will be managed and shared with the ATE community and other interested parties. The coordination, documentation, and implementation of this plan helps to ensure that ATE Central benefits not only ATE grantees, but the greater National Science Foundation community and the general public through free and open access to the innovative technical educational programs and materials created by the ATE community.

Data Description

Data Type	Data Description	Metadata Description
Metadata	Educational resources - Database of information that describes and points to educational resources created by ATE centers and projects and/or stored and archived by ATE Central. Center and project information - Database of information that describes the individual ATE projects and centers.	Qualified Dublin Core with additional fields specific to the ATE community and supporting ATE Central workflow.
Materials and Publications	ATE Community Archive – Deliverables and metadata from ATE projects and centers, hosted online by ATE Central in MS Word or PDF formats. ATE Events – Web-based description of upcoming events with past events archive. ATE Central Connection – Email and web-based newsletter supporting ATE community. ATE Central Handbook – PDF document supporting project development for ATE grantees.	Title, author, date, and format metadata embedded in MS Word, HTML, and PDF files. Archived materials will be described in Qualified Dublin Core with additional fields specific to the ATE community and the supporting ATE Central workflow.
Evaluation Data	Annual Reports – PDF reports submitted annually. Survey Data – PDF compilations of intercept and general web survey data from ATE PIs.	Title, author, date, and format metadata embedded in PDF files.

Data Standards

The metadata produced by ATE Central will be based on Dublin Core (*http://www.dublincore.org*), an authoritative and interoperable metadata standard used worldwide. This metadata will be available for harvesting via the Open Archives

Initiative Protocol for Metadata Harvesting (OAI-PMH - *http://www.openarchives.org/pmh/*). All data created by the project will be stored locally on servers owned and maintained by Internet Scout.

Data Access and Sharing

All metadata produced by ATE Central is freely available. Interested parties can harvest metadata via OAI-PMH or contact the project for alternative formats such at tab-delimited or Excel files. Outreach materials and publications will also be freely available via the ATE Central web site or by contacting the ATE Central Outreach Coordinator. Additionally, ATE Central will share with any interested person documentation of the processes and procedures used to build the project. Since this data is freely available to anyone, derivatives are encouraged.

Privacy

While usage statistics are gathered from the ATE Central site, the information is compiled in aggregate and personally identifiable data will never be passed along to any third party. All information entered into the site for registration is confidential.

Intellectual Property

The ATE Central metadata repository points only to web sites and other materials that are already freely available online. However, requests from content owners who wish to have metadata leading to their materials removed from ATE Central will be honored in a timely manner. If ATE Central hosts any materials created by another ATE center or project for the purpose of preservation, the original owner will retain copyright.

Archiving and Preservation

All metadata and publications created by ATE Central will be kept alive on the project's servers and online after the duration of the project. ATE Central will work with ATE Central Advisory Board, NSF, and the ATE community to identify additional viable preservation paths, for both data created or maintained by ATE Central and deliverables and data from the ATE community as a whole.

Appendix C: EvaluATE Survey 2014 Fact Sheet

Advanced Technological Education Survey 2014 Fact Sheet

This material is based upon work supported by the National Science Foundation under Grant No. 1204683. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

Corey Smith, Lori Wingate, & Arlen Gullickson *June 2014*

Highlights

In 2013, National Science Foundation-funded Advanced Technological Education projects and centers

- educated approximately 109,550 students—52 percent of whom were at two-year colleges and 41 percent at secondary schools.[1]
- offered programs at about 2,380 educational institutions across the country.
- developed 2,580 curriculum materials, 18 percent of which were full courses and 3 percent were published commercially.
- offered more than 3,270 professional development opportunities, which served more than 80,030 educators—roughly 45 percent of whom were two-year college faculty and 43 percent secondary school teachers.
- had approximately 1,460 articulation agreements in place, and developed 200 agreements in 2013; these agreements helped about 2,530 students matriculate between high school and two-year institutions and 2,700 students between two-year and four-year institutions.
- served a student population that was 51 percent minority and 26 percent female.
- collaborated with more than 10,240 groups that provided more than $12 million in monetary contributions and $13 million in-kind support.

This fact sheet summarizes data gathered in the 2014 survey of National Science Foundation (NSF) Advanced Technological Education (ATE) grant recipients. Conducted by EvaluATE, the evaluation resource center for the ATE program located at The Evaluation Center at Western Michigan University, this was the fifteenth annual survey of ATE projects and centers. Included here are findings about the program's grantees and their activities, accomplishments, and impacts during the 2013 calendar year.

The 2014 survey was a census of active ATE principal investigators (PIs) (N=240). Survey responses were received from 221 grantees (92%), including 177 projects, 38 centers, and 6 targeted research projects. Most survey recipients completed the sections on Grantee Characteristics and Practices (91%) and Special Topics (62%). About half of the survey recipients completed the sections on Materials Development (46%), Professional Development (53%), and Program Improvement (45%). Whether grantees completed those sections depended on the nature of their grant work—that is, those who allocated at least $100,000 or 30 percent of their budgets in 2013 to the activities in question were expected to complete the relevant sections. PIs who spent less had the option to complete each section.

[1] Reported numbers of participants, products, and activities throughout this report are rounded to the nearest ten. The 'N' indicated in table and figure titles represents the number of respondents for a given item.

Grantee Characteristics and Practices

The ATE program was established by NSF in response to the *Scientific and Advanced-Technology Act of 1992*, which was intended "to establish a national advanced technician training program, utilizing the resources of the nation's two-year associate-degree-granting colleges."[2] Consistent with that mandate, the ATE program solicitation states that "the ATE program focuses on two-year colleges and expects two-year colleges to have a leadership role in all projects." Accordingly, two-year colleges figure prominently in the program, as both grantees (Figure 1) and beneficiaries (Figure 2) of grant-supported activities. Fund allocations shown in Figure 2 include support for both students and faculty.

Figure 1. ATE Grant Recipient Institutions (N=220)

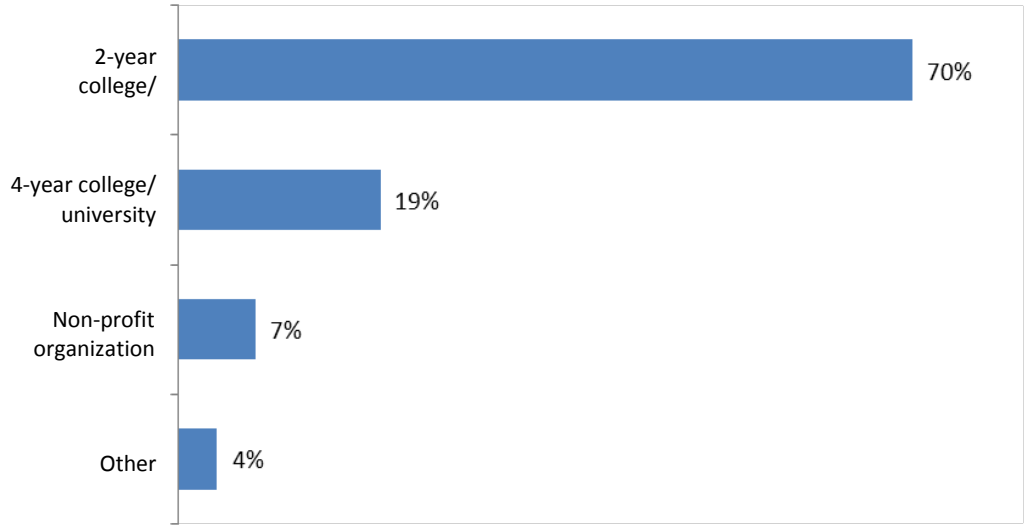
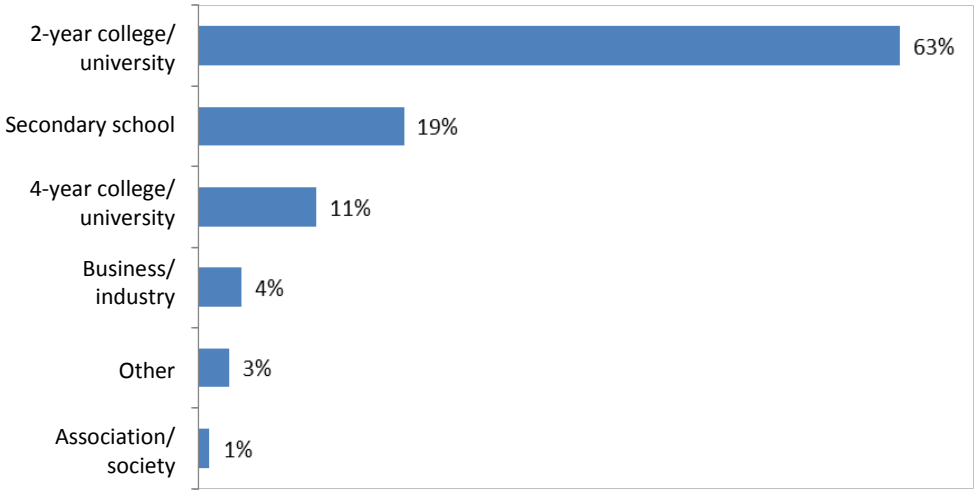


Figure 2. Grantee-Reported Budget Allocations to Serve Audience Types (N=212)



[2] Public Law 102-476.

The content-area emphases of ATE grantees are diverse, as shown in Table 1. Despite this, the top four content areas accounted for 59 percent of the grantees. All percentages are within 3 percent of the amounts reported on last year's survey.[3] Agricultural and environmental technologies saw the largest drop from 2012, particularly in the actual number of grantees reporting this emphasis. The drop can be explained by a considerable number of respondents who changed their reported emphasis in 2013 from that which they reported in 2012.

Table 1. Reported Content-Area Emphases (N=219)

Content area	*Number of grantees*	*Percent of grantees*
Information, geospatial, and security technologies	33	15%
Agricultural and environmental technologies	32	15%
Other*	32	15%
Advanced manufacturing technologies	30	14%
Biotechnology and chemical processes	19	9%
Learning, evaluation, and research	19	9%
Engineering technologies	18	8%
Recruitment	12	5%
Technology teacher preparation	11	5%
Micro and nanotechnologies	10	5%
Core courses	3	1%

** Most respondents who selected "other" reported interdisciplinary or multidisciplinary foci.*

Approximately 60 percent of budgeted funds were devoted directly to professional development, materials development, program improvement, and targeted research. Allocations to the first three were roughly equal, but overall projects and centers spent much less on targeted research. The lower expenditure for targeted research is explained in part by the smaller percentage of projects that engaged in this activity.

Twenty-eight percent of respondents (n=62) reported spending grant funds on **targeted research.** Within this group of grantees, the average budget allocation for research was 20 percent.[4] Budgeted funds for evaluation and advisory committee support combined, amount to 10 percent across all projects and centers.

[3] See the 2013 ATE Survey Fact Sheet at evalu-ate.org/annual_survey/reports.

[4] In 2010, we asked survey respondents to describe the focus of their research activities. At that time, research topics included instruction or curriculum development to improve student outcomes; workforce analysis, best practices, and trends documentation; evaluation, assessment, and standard setting; developing or implementing new technology; employment outcomes; and other issues. For more information, see the brief on ATE targeted research at evalu-ate.org/annual_survey/reports.

Figure 3. Grantee-Reported Budget Allocations for Specific Activities/Costs (N=213)

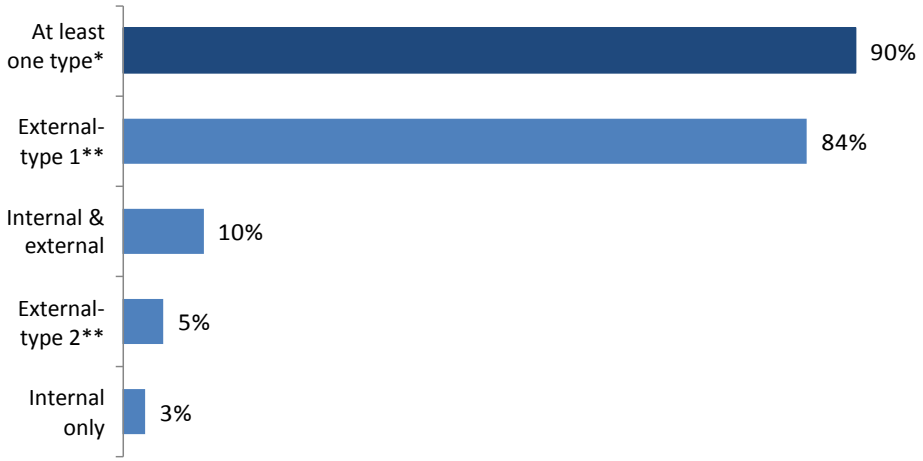
**Note: "Other" costs reported by respondents included things like salaries, travel, equipment, outreach, dissemination, marketing, recruitment, administration, and student support. Many of these could/should have been included under the larger categories listed on the survey form.*

Most respondents (83%) reported some expenditure on **evaluation** in 2013.[5] Within this group, the average budget allocation was 8 percent. This average expenditure has remained consistent since 2010, indicating ongoing budgetary support for evaluation services.

An even larger percentage of projects and centers reported having an evaluator (90%). Figure 4 shows most respondents reported using evaluators that were external to both the grant and the institution (84%). The use of an external evaluator increased 7 percent from 2013. Additionally 13 percent of respondents indicated they had an internal evaluator working alone or in conjunction with an external evaluator.

[5] Not all grantees who reported having an evaluator also reported expenditure on evaluation in 2013. Aside from missing data, possible causes for this discrepancy may be that some new grants had not yet paid for any evaluation services and/or that the compensation for internal evaluators was not reported under Evaluation on the question about budget allocations.

Figure 4. 2013 ATE Grantees' Use of Evaluators (N=212)



** Note: This bar is not a complete sum of the four bars below it because some grantees reported having an evaluator, but did not indicate what type of evaluator they had.*

***Note: Type 1 external evaluator = external to both institution and grant; Type 2 external evaluator = external to grant, but internal to institution.*

Articulation agreements are intended to enable students who complete a program or series of courses to matriculate to a higher level of education at specified institutions. Forty-four percent of respondents indicated that developing articulation agreements was part of their project/center activities; 34 percent provided additional information on these agreements. The program totals for 2013 are shown in Table 2. A majority (59%) of these agreements were between high schools and two-year colleges.

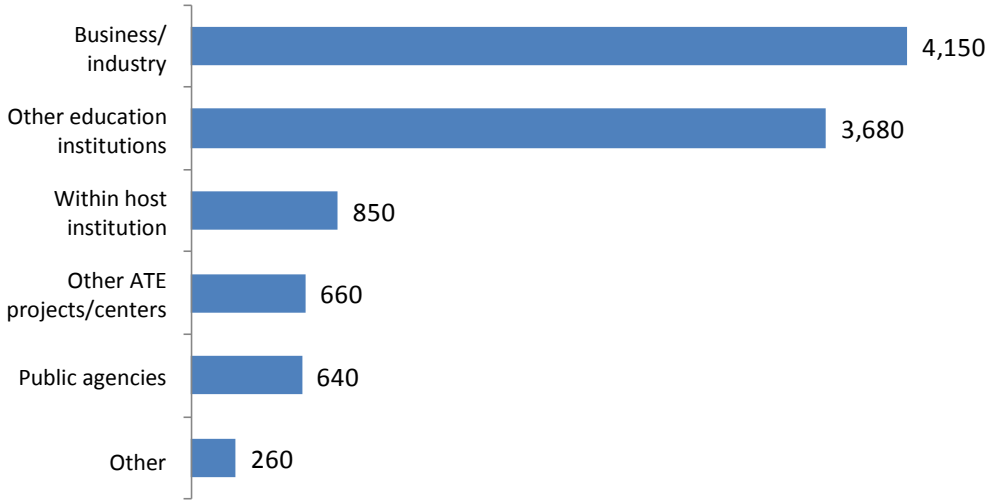
Table 2. Articulation Agreements in 2013 (N=76)

	Between high schools and 2-year colleges	*Between 2-year and 4-year colleges*	*Total*
Agreements developed	140	60	200
Agreements in place	860	590	1,450
Institutions involved	690	500	1,190
Students that matriculated	2,530	2,700	5,230

The survey's questions about **collaboration** were accompanied by a definition of this term, describing it as "a project/center's relationship with another institution, business, or group that provides money or other support to your project or center. Collaborators are not funded by the grant." Respondents reported 10,240 collaborating organizations, which collectively added $25 million to the ATE program—$12 million in monetary support and $13 million in-kind. The median number of collaborations reported was 17. The median amount of monetary support reported by grantees was $26,250.

The totals for both the number of collaborations and the amount of monetary support were greatly impacted by just a few grants. Three grants accounted for 23 percent of the total number of reported collaborations[6]. Furthermore, two grants accounted for 38 percent of the total monetary support reported by grantees. Business/industry and educational institutions were the most common types of collaborators, comprising more than three-quarters of all collaborating organizations (Figure 5).

Figure 5. Number of ATE Collaborating Organizations (N=198)



Materials Development

By completing this section of the survey, 103 PIs (43% of all survey recipients) indicated that they were significantly involved in developing curriculum and educational materials for national dissemination. Of those who responded to this section, 53 percent reported that they allocated at least 30 percent of their direct costs or $100,000 to materials development in 2013; the remainder indicated that they did not meet this threshold but chose to report on their work in this area because they viewed their materials development efforts as significant.

Materials addressed included various media (textbooks, laboratory experiments and manuals, software, videos, or other courseware) used to convey the content and instruction of courses, modules, and activities, defined as follows:

Course: A stand-alone collection of instructional content and activities to achieve some desired educational outcomes. Courses usually last a semester or a year.

Module: A self-contained collection of content and activities designed to achieve a set of specific objectives. Modules are generally shorter than courses and focus on fewer outcomes.

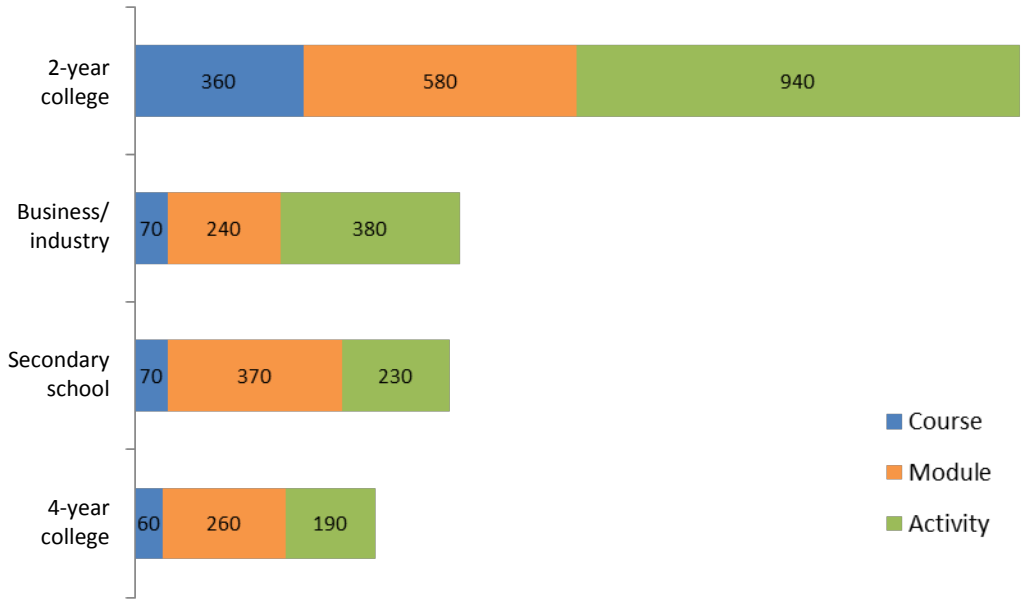
[6] We followed up with these three grantees to understand the nature of these large scale collaborations. The collaborations center on events such as student competitions, workshops, partnership meetings and consultations.

Activity: An instructional exercise, such as a laboratory experiment or test, designed to achieve a discrete learning outcome.

In total, 2,580 materials were reported, of which 990 were in draft and/or field-test stage in 2013 and 1,520 had been completed. Of the materials completed, 30 percent were reported to be in use outside of the grantee's home and partner institutions. Three percent (69) were published commercially in 2013. This publication rate is consistent with 2012 (2%) but has dropped substantially from reported values in 2010 (25%) and 2011 (10%).[7]

Figure 6, which indicates the number of developed courses, modules, and activities for different education levels, depicts a strong focus on the two-year college level. In addition to the materials included in Figure 6, 53 materials were reported for the "other" education level category, including four courses, 26 modules, and 27 activities. The sum of the materials reported by education level (3,750) exceeds the total number of materials developed by 1,170, suggesting that a large proportion of materials were intended to serve multiple levels.

Figure 6. Education Levels Served by Materials Developed (N=98)



[7] Because the materials reported in this section include those developed or completed in *2013* only, we are not capturing publication of materials developed in prior years.

Professional Development

By completing this section of the survey, 117 PIs (49% of survey recipients) indicated that they were significantly involved in providing professional development in 2013. Of this group, 44 percent reported that they allocated at least 30 percent of their direct costs or at least $100,000 to professional development in 2013; the rest indicated they did not meet either threshold, but reported on their professional development because of its significance to their project or center.

These respondents reported providing 3,270 professional development activities in 2013, ranging from short presentations intended primarily to raise awareness to long-term periodic instructional activities (e.g., internships or peer coaching). A total of 80,030 individuals participated in these ATE-supported professional development activities. As the length of the professional development activity increased, the numbers of activities conducted and participants engaged in those activities dropped off substantially.

Figure 7 shows the number of professional development **activities** of each length that were offered in 2013.[8] Figure 8 parallels Figure 7 and shows the number of **participants** in each type of activity.

A little more than half (51%) of the professional development activities were short presentations to raise awareness and engaged a majority (63%) of the participants. Twenty-nine percent of the professional development activities lasted a day or more; these activities engaged 17 percent of all participants.

The number of long-term activities (i.e., one or more weeks in length) increased by more than a third from 2012 to 2013 (up to 400 from 280). For these long-term instructional activities, 60 percent of participants received some form of follow-up.

[8] See the 2011 ATE Survey Fact Sheet at evalu-ate.org/annual_survey/reports.

Figure 7. Number of ATE Professional Development Activities by Length (N=120)

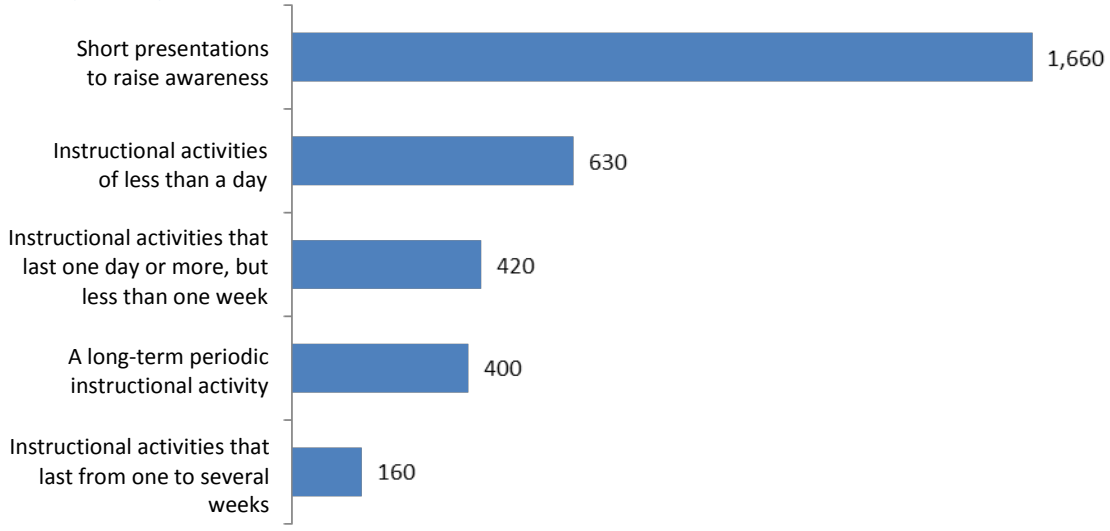
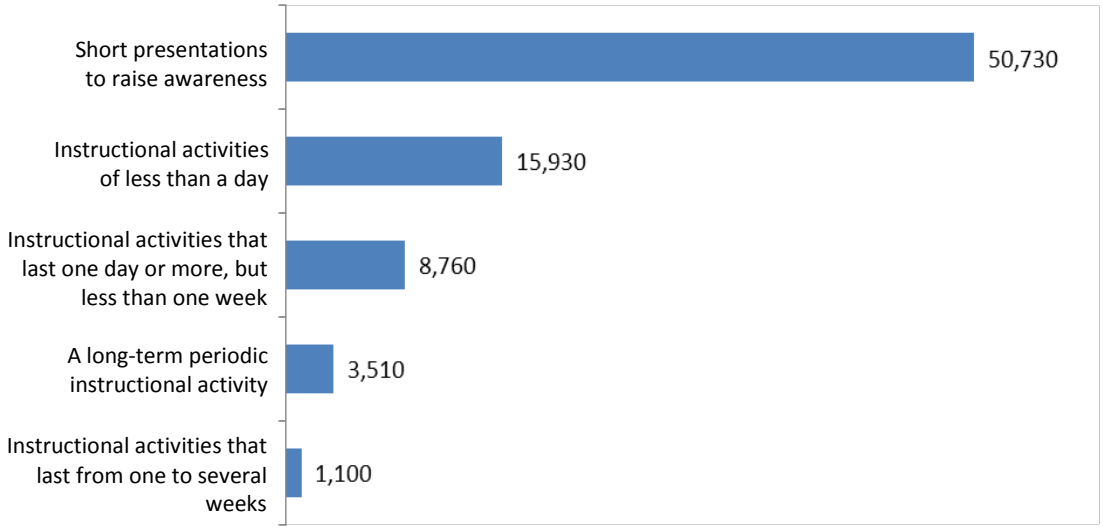


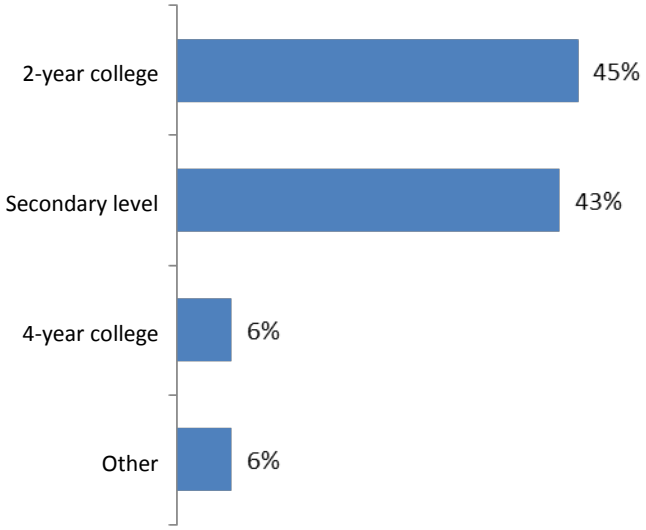
Figure 8. Number of ATE Professional Development Participants across Activities of Different Lengths (N=115)



The number of professional development participants reported by education level increased from 60,300 participants in 2012 to 65,940 participants in 2013. As Figure 9 shows, most participants were from two-year colleges or secondary schools with approximately equal numbers from both groups. The number of participants from four-year colleges in 2013 was much lower declining to six percent from 15 percent in 2012. This shift coincides with an increase in the percentage of participants from the secondary level. [9]

[9] The discrepancy in total participant counts between Figures 8 and 9 is a result of missing data (questions about the total number of participants and the breakdown by education level were asked in separate items on the survey form). Fewer respondents reported participant data by education level than total participant counts.

Figure 9. Percentage of ATE Professional Development Participants by Education Level (N=111)



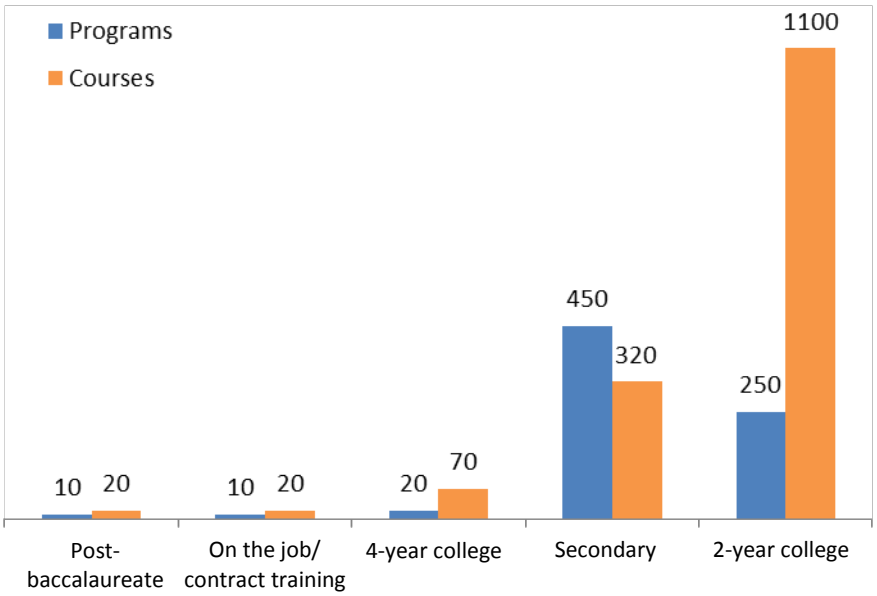
Program Development/Improvement

Survey questions about program development and improvement were preceded by a definition of a program as "a sequence of courses, laboratories, and/or work-based experiences that lead students to a degree, certification, or occupational competency point." Here we report findings about ATE-supported **programs** and **courses**, as well as the **students** enrolled in them.

Fifty two percent of survey recipients (n=125) completed the Program Improvement section, which includes questions about courses and programs developed or modified with grant funds. Of this group, 68 (54%) reported that they allocated at least 30 percent of their direct costs or at least $100,000 to program improvement in 2013; the remainder indicated that they did not meet this threshold but viewed their program development efforts as substantial and chose to report on their work in this area. Respondents to this section include 109 of the 139 PIs (78%) who indicated that their projects or centers provided ATE-supported instruction.

Collectively, the respondents in this section reported that they offered 740 programs and 1,530 courses with ATE support in 2013. A majority of the courses (72%) were developed for the two-year college level (Figure 10). Because more grantees indicated that they provided ATE-supported instruction than completed the program improvement section the course and program totals likely underestimate the total numbers supported by ATE.

Figure 10. Number of ATE-Supported Programs and Courses by Education Level (N=109)



Respondents were asked to report the number of **locations** by education level where ATE-supported programs were offered. The number of reported locations increased from 2,240 in 2012 to 2,380 in 2013. Of these 2,380 locations, most were at secondary schools (63%) and two-year colleges (26%). These data indicate the continuation of a trend where more programs are being offered at secondary school locations, whereas prior to 2011, more programs were being offered at two-year college locations.

The high proportion of programs offered at secondary schools is largely due to two grants. Those two grants are responsible for 66 percent of the reported secondary-level locations. The actual number of projects engaged in offering programs strongly favors community colleges, outnumbering those offering secondary programming by almost two to one. One hundred and ten respondents reported providing programs at two-year colleges compared to 66 who reported providing programs at secondary schools

Table 3 presents **student demographic** findings. It also compares the ATE numbers with U.S. population statistics. More than half of the students (51%) were from racial/ethnic minorities, and a little more than one fourth (26%) were female. These numbers represent an increase from last year's survey. They also mark the first year, since 2009, that non-white students make up the majority of the students reported. Participation by women continues to be well below their representation in the U.S. population.

Inconsistency between the total number of students reported (in Figure 11 and related discussion) and the sums of subgroups (Table 3) can be attributed to

some PIs not reporting demographic data (student demographics data were gathered via a separate question from total enrollments).

Table 3. Demographic Characteristics of ATE Students

Demographic Characteristic	*Number*	*Percentage of category*	*Percent of U.S. population*
Gender (N=108)			
Male	76,120	74%	49%
Female	26,960	26%	51%
Race/ethnicity (N=100)*			
Hispanic/Latino	17,630	19%	17%
American Indian/Alaska Native	1,150	1%	1%
Asian	5,050	5%	5%
Black/African American	20,000	21%	13%
Native Hawaiian/Pacific Islander	770	1%	0.2%
Multiracial	2,810	3%	2%
White	45,990	49%	63%
Students requesting accommodation under the Americans with Disabilities Act (N=29)	4,670	-	-

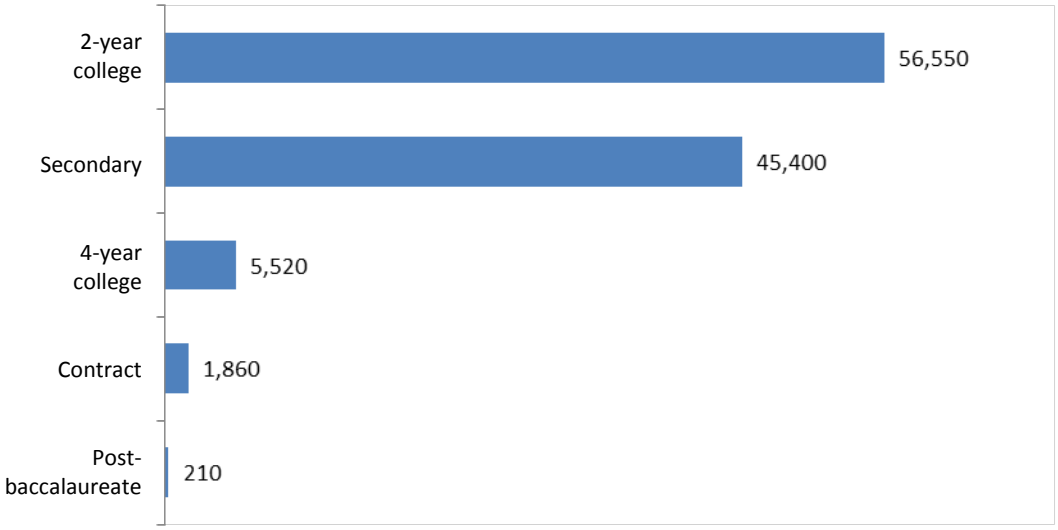
† Source: http://quickfacts.census.gov/qfd/states/00000.html

*Hispanic origin is not a race, and persons of Hispanic origin may be of any race.

All PIs were asked to report the total number of **individual students** who took at least one course in one of their ATE-supported programs in 2013. Slightly more than half (53%) of all ATE respondents (N=117) completed these questions on student enrollments. Given that 169 grantees indicated they spent some portion of their ATE budgets on program improvement, it is likely that the number of students reported is an underestimate of the ATE program's reach.

Responding PIs reported that their ATE funds supported the instruction of 109,550 students, with 52 percent enrolled at two-year colleges and 41 percent at secondary schools (Figure 11).

Figure 11. Number of Students in ATE-Supported Courses by Education Level (N=117)



Other ATE Survey Reports

Additional reports based on annual ATE survey data, dating back to 2000, are available at evalu-ate.org/annual_survey/reports.

Custom reports may be developed upon request. For more information, contact corey.d.smith@wmich.edu.